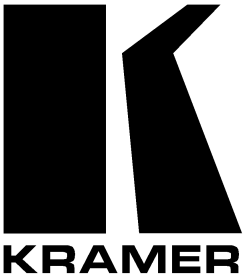
Kramer Electronics, Ltd.



USER MANUAL

Models:

631T, ***HDMI Optical Transmitter***

631R, ***HDMI Optical Receiver***

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This addendum describes the Power Connect feature used with Kramer machines, and the choice between STP and UTP CAT5 cables.

Power Connect Feature[1]

The Power Connect feature lets you power a transmitter / receiver system by connecting just one power adapter to either the transmitter or the receiver. The other unit is fed over the same CAT5 cable.

The Power Connect feature applies as long as the CAT5 cable is heavy gauge cable (that is, it can carry power). The distance does not exceed 50 meters on standard cable.

For a distance of 100 meters, separate power supplies must be connected to the transmitter and to the receiver simultaneously, unless using heavy gauge CAT5 cable.

Shielded Twisted Pair (STP) / Unshielded Twisted Pair (UTP)

The decision whether to use shielded twisted pair (STP) cable or unshielded twisted pair (UTP) cable depends on the nature of the application.

It is recommended that in applications with high interference, shielded twisted pair (STP) cable will give better results. However, the shield itself does create a capacitance that degrades the frequency response of the machines. For shorter distances, of 50m or so, shielded twisted pair (STP) cable is preferred because it provides protection from interference (degradation is non-apparent).

For a long range application, unshielded twisted pair (UTP) cable is preferred. However, the unshielded twisted pair (UTP) cable should be installed far away from electric cables, motors etc., which are prone to create electrical interference.

1 This section of the addendum is only relevant to machines that support this feature (for example, the TP-104; not the TP-100)

1 Introduction

Welcome to Kramer Electronics (since 1981): a world of unique, creative and affordable solutions to the infinite range of problems that confront the video, audio and presentation professional on a daily basis. In recent years, we have redesigned and upgraded most of our line, making the best even better! Our 350-plus different models now appear in 8 Groups[1], which are clearly defined by function.

Congratulations on purchasing your Kramer DigiTOOLS® **631T** *HDMI*[2] *Optical Transmitter* and **631R** *HDMI*[2] *Optical Receiver*! The **631T / 631R** pair has a transmission range of more than 300 ft. (more than 100 meters). The **631T / 631R** are ideal for:

- Home theater, presentation and multimedia applications
- Long range multimedia distribution for cinemas, stores, and entertainment centers

The **631T** *HDMI*[2] *Optical Transmitter* and **631R** *HDMI*[2] *Optical Receiver* are available as two separate packages:

The **631T** package includes the following items:

- **631T** *HDMI*[2] *Optical Transmitter*
- Power adapter (12V DC 500mA Input)[3] and this user manual[4]

The **631R** package includes the following items:

- **631R** *HDMI*[2] *Optical Receiver*
- Power adapter (12V DC 2.1A Input)[3] and this user manual[4]
- One HDMI/HDMI[2] male-to-male cable

2 Getting Started

We recommend that you:

- Unpack the equipment carefully and save the original box and packaging materials for possible future shipment

1 GROUP 1: Distribution Amplifiers; GROUP 2: Video and Audio Switchers, Matrix Switchers and Controllers; GROUP 3: Video, Audio, VGA/XGA Processors; GROUP 4: Interfaces and Sync Processors; GROUP 5: Twisted Pair Interfaces; GROUP 6: Accessories and Rack Adapters; GROUP 7: Scan Converters and Scalers; and GROUP 8: Cables and Connectors

2 High-Definition Multimedia Interface

3 When setting up a transmitter / receiver system you can connect the 12V power supplies to the transmitter and to the receiver simultaneously. However, the power connect feature does let you connect just *one* power supply to either the transmitter or receiver. In such a case, use the 2.1A power supply

4 Download up-to-date Kramer user manuals from the Internet at this URL: http://www.kramerelectronics.com

- Review the contents of this user manual
- Use Kramer high performance optical cables[1]. Note that the units are designed for use with **MULTI-MODE** optical cables.

3 Overview

This user manual describes the Kramer DigiTOOLS® **631T** *HDMI*[2] *Optical Transmitter* and the Kramer DigiTOOLS® **631R** *HDMI*[2] *Optical Receiver.*

3.1 About HDMI

High-Definition Multimedia Interface (HDMI) is an uncompressed all-digital[2] audio/video interface, widely supported in the entertainment and home cinema industry. It delivers the highest image and sound quality.

In particular, HDMI:

- Provides a simple[3] interface between any audio/video source, such as a set-top box, DVD player, or A/V receiver and an audio and/or video monitor, such as a digital television (DTV), over a single lengthy[4] cable
- Supports standard, enhanced, high-definition video, and multi-channel digital audio[5] on a single cable
- Transmits all ATSC HDTV standards and supports 8-channel digital audio, with bandwidth to spare to accommodate future enhancements and requirements
- Benefits consumers by providing superior, uncompressed digital video and audio quality via a single cable[6], and user-friendly connector
- Is backward-compatible with DVI (Digital Visual Interface)
- Supports two-way communication between the video source (such as a DVD player) and the DTV, enabling new functionality such as automatic configuration and one-button play

1 The complete list of Kramer cables is on our Web site at http://www.kramerelectronics.com

2 Ensuring an all-digital rendering of video without the losses associated with analog interfaces and their unnecessary digital-to-analog conversions

3 With video and multi-channel audio combined into a single cable, the cost, complexity, and confusion of multiple cables currently used in A/V systems is reduced

4 HDMI technology has been designed to use standard copper cable construction at up to 15m

5 HDMI supports multiple audio formats, from standard stereo to multi-channel surround-sound. HDMI has the capacity to support Dolby 5.1 audio and high-resolution audio formats

6 HDMI provides the quality and functionality of a digital interface while also supporting uncompressed video formats in a simple, cost-effective manner

HDMI has the capacity to support:

- Existing high-definition video formats (720p, 1080i, and 1080p/60), as well as standard definition formats such as NTSC or PAL

3.2 Recommendations for Best Performance

When setting up the **631T / 631R**, be aware that:

- The Media Receiver or graphic controller card must have an HDMI port that matches the maximum graphic resolution feature of the display to be connected. When using a computer, there are no special hardware requirements concerning memory size, CPU speed or chipsets
- There are no special software requirements[1]
- We recommend that you test the entire platform with its application using a short length copper cable, before you install the optical link
- The power connect feature lets you power the **631T / 631R** system by connecting just one power adapter to either the **631T** or the **631R**. The other unit is fed via the CAT5 cable
- **CAUTION: Never** look directly into the LC receptacles of the **631T / 631R**, while it is powered on[2]

To achieve the best performance[3]:

- Connect only good quality connection cables, thus avoiding interference, deterioration in signal quality due to poor matching, and elevated noise levels (often associated with low quality cables)
- Avoid interference from neighboring electrical appliances and position your Kramer DigiTOOLS® away from moisture, excessive sunlight and dust
- Be sure to keep the optical cable's connectors clean. Close them when not in use, to protect them against exposure to dirt and dust

1 However, the HDMI graphic controller and display peripheral should be operational with the operating system and the application

2 Even though this product is regulated strictly enough to operate under the Laser Class 1, classified by the CDRH/FDA for eye safety

3 See also section 5.4

4 Your 631T / 631R

This section describes the:

- **631T** *HDMI Optical Transmitter* (see section 4.1)
- **631R** *HDMI Optical Receiver* (see section 4.2)

4.1 Your DigiTOOLS® 631T HDMI Optical Transmitter

The **631T** is a high performance HDMI optical transmitter that accepts an HDMI input signal, and transmits to a **631R** *HDMI Optical Receiver*. The **631T / 631R** pair has a transmission range of more than 300 ft. (more than 100 meters). In addition, the **631T**:

- Supports up to 1.65Gbps bandwidth per graphic channel[1]
- Can power or be powered by the **631R** receiver over the same CAT5 cable
- Is 12VDC fed

Figure 1 illustrates the **631T** *HDMI Optical Transmitter*:

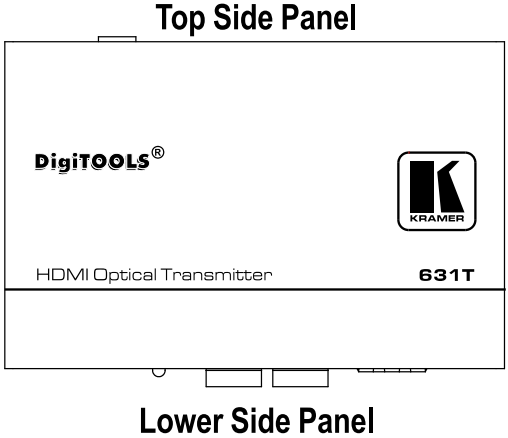

Figure 1: 631T HDMI Optical Transmitter

Figure 2 and Table 1 define the top side panel:

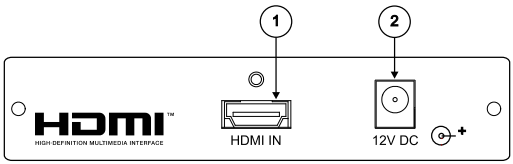

Figure 2: 631T HDMI Optical Transmitter (Top Side Panel)

1 Suitable to resolutions up to UXGA at 60Hz, and for all HD resolutions

Table 1: 631T HDMI Optical Transmitter (Top Side Panel) Features

#	Feature	Function
1	*HDMI IN*	Connects to the HDMI source
2	*12V DC*	+12V DC connector for powering the unit

Figure 3 and Table 2 define the lower side panel:

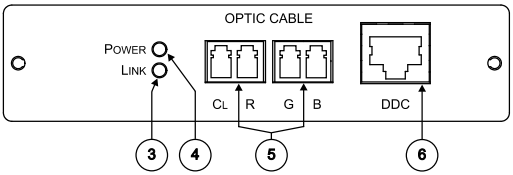

Figure 3: 631T HDMI Optical Transmitter (Lower Side Panel)

Table 2: 631T HDMI Optical Transmitter (Lower Side Panel) Features

#	Feature	Function
3	*LINK* LED	Illuminates when receiving a valid input signal
4	*POWER* LED	Illuminates when receiving power
5	OPTIC CABLE	Connect to the connector on the **631R**
6	*DDC* RJ-45 Connector	Connects to[1] the *DDC* RJ-45 connector on the **631R**

1 Using a UTP CAT5 cable with RJ-45 connectors at both ends (the PINOUT is defined in Table 5 and Figure 9)

4.2 Your DigiTOOLS® 631R HDMI Optical Receiver

The **631R** is a high performance HDMI optical receiver that outputs an HDMI signal. The **631T / 631R** pair has a transmission range of more than 300 ft. (more than 100 meters).

In addition, the **631R**:

- Supports up to 1.65Gbps bandwidth per graphic channel[1]
- Can power or be powered by the **631T** transmitter over the same CAT5 cable
- Is 12VDC fed

Figure 4 illustrates the **631R** *HDMI Optical Receiver*:

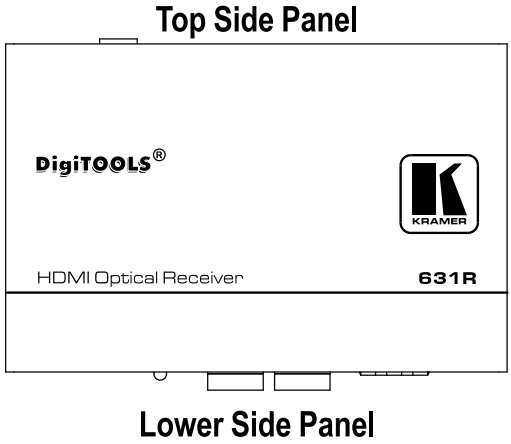

Figure 4: 631R HDMI Optical Receiver

Figure 5 and Table 3 define the lower side panel:

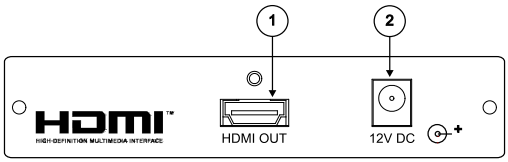

Figure 5: 631R HDMI Optical Receiver (Top Side Panel)

Table 3: 631R HDMI Optical Receiver (Top Side Panel) Features

#	Feature	Function
1	*HDMI OUT*	Connects to the HDMI acceptor
2	*12V DC*	+12V DC connector for powering the unit

1 Suitable to resolutions up to UXGA at 60Hz, and for all HD resolutions

Figure 6 and Table 4 define the lower side panel:

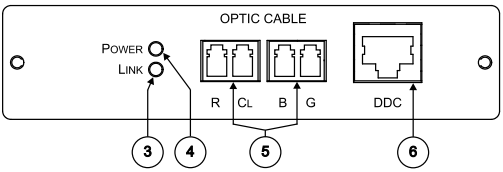

Figure 6: 631R HDMI Optical Receiver (Lower Side Panel)

Table 4: 631R HDMI Optical Receiver (Lower Side Panel) Features

#	Feature	Function
3	*LINK* LED	Illuminates when receiving a valid input signal
4	*POWER* LED	Illuminates when receiving power
5	OPTIC CABLE	Connect to the connector on the **631T**
7	*DDC* RJ-45 Connector	Connects to[1] the *DDC* RJ-45 connector on the **631T**

1 Using a UTP CAT5 cable with RJ-45 connectors at both ends (the PINOUT is defined in Table 5 and Figure 9)

5 Using the 631T/631R HDMI Optical Transmitter/Receiver

You can use the **631T** and **631R** to configure an HDMI optical transmitter and receiver system. In particular, this section describes how to:

- Connect the **631T/631R** transmitter and receiver system (see section 5.1)
- Operate the **631T/631R** transmitter and receiver system (see section 5.2)
- Wire the DDC[1] (CAT5) RJ-45 connectors (see section 5.3)
- Avoid pitfalls (see section 5.4)

5.1 Connecting the 631T/631R HDMI Optical Transmitter/Receiver

The example in Figure 7 shows how to configure an HDMI optical transmitter and receiver system from the perspective of connecting the source and acceptor. The example in Figure 8 shows how to configure an HDMI optical transmitter and receiver system from the perspective of connecting the OPTIC and DDC cables.

To connect the **631T** with the **631R**, as the examples in Figure 7 and Figure 8 illustrate, do the following:

1. On the **631T**, connect the HDMI source (for example, a set top box[2]) to the HDMI IN connector, using the Kramer HDMI copper cable.
   Note: Ensure that the system is not powered up when connecting the HDMI source.
2. On the **631R**, connect the HDMI OUT connector to the HDMI acceptor (for example, a display), using the Kramer HDMI copper cable.
   Note: Do not look directly into the LC receptacles of the **631T**, while powered on, although this product is regulated strictly enough to operate under the Laser Class 1, classified by CDRH/FDA for eye safety.
3. Remove the module dust covers and connect each duplex LC fiber cable one-by-one to each of the four LC receptacles of the **631T** and **631R**. The 4 LC patch cord fiber bundled cable lets you transmit 4 channels (R, G, B, and CL (CLOCK)) of graphic data and multi-channel audio data over it.
   Note: Carefully recheck the polarities and ensure that the duplex connectors are fully engaged.
4. Connect the DDC RJ-45C connector on the **631T** to the DDC RJ-45C connector on the **631R**, via UTP cabling, see section 5.3.

1 Digital Display Channel

2 Alternatively, you could connect a computer or other HDMI media source

5. Connect the 12V 2.1A DC power adapter to the power socket of either[1] the **631T** or **631R**, and connect the adapter to the mains electricity.
   The signal from the HDMI source is transmitted via CAT5 and fiber optic cables, decoded and converted at the HDMI OUT connector to the HDMI acceptor.

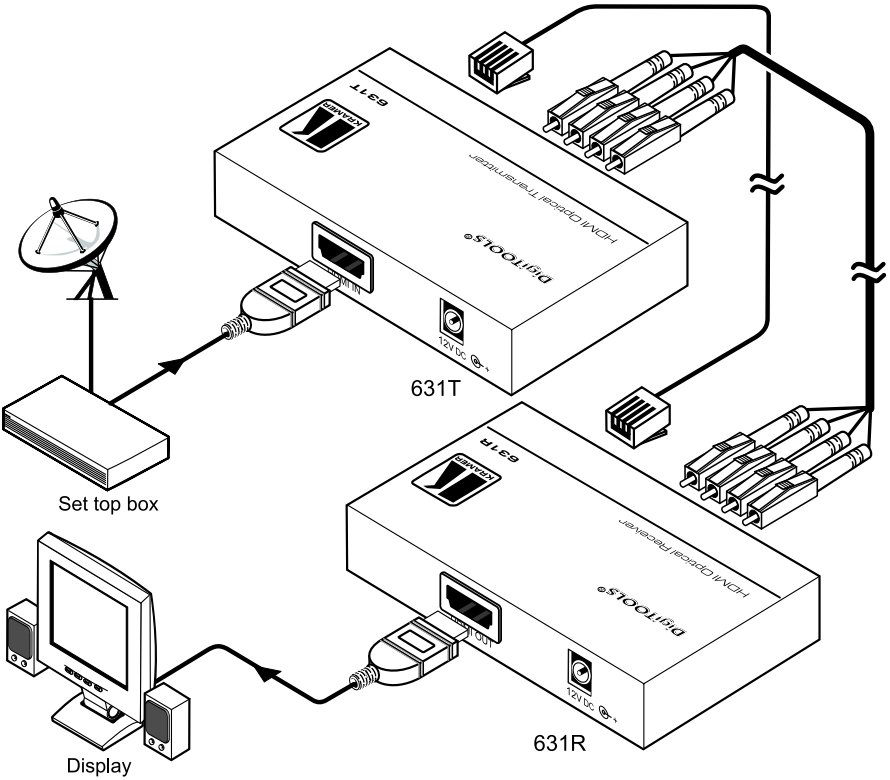

Figure 7: Connecting the 631T/631R (Source and Acceptor Perspective)

1 The power connect feature lets you connect just one power adapter to either the transmitter or receiver. Alternatively, connect the separate power supplies to the transmitter and to the receiver simultaneously

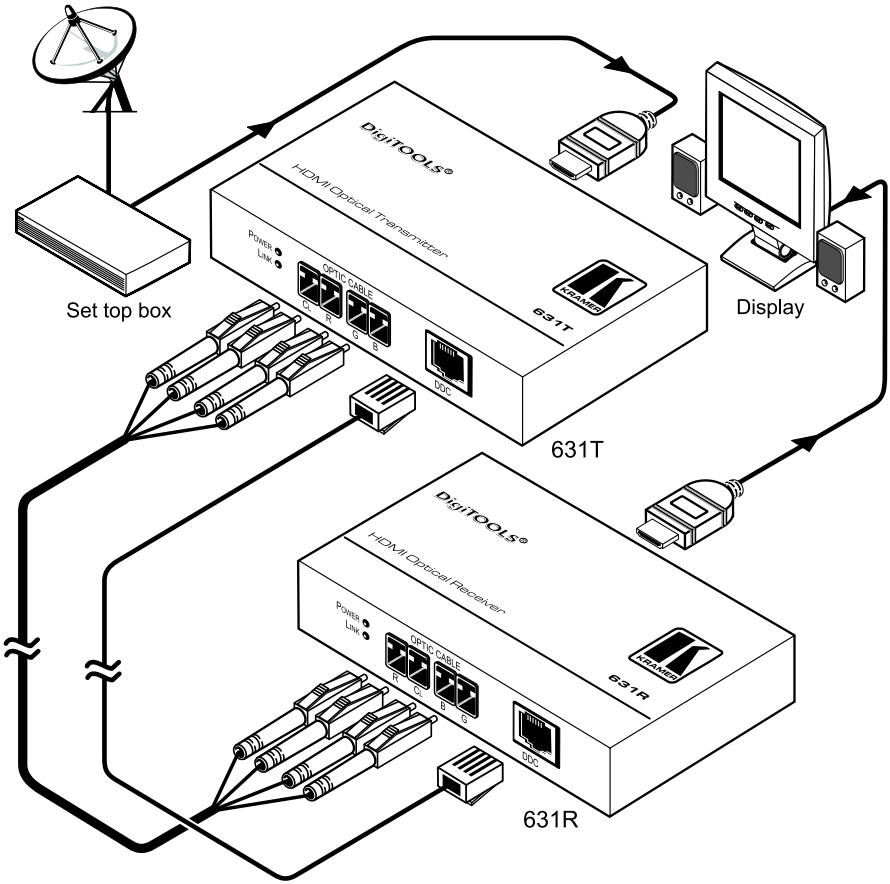

Figure 8: Connecting the 631T/631R (OPTIC and DDC Cables Perspective)

5.2 Operating the 631T/631R HDMI Optical Transmitter/Receiver

To operate the **631T / 631R** *HDMI Optical Transmitter/Receiver* system:

- Turn ON the power on the set-top box and the display

Note: Avoid "hot plugging" the **631T** or **631R**. This is not a recommended practice with live digital voltages (but it can be done)

5.3 Wiring the DDC[1] (CAT5) RJ-45 Connectors

Table 5 and Figure 9 define the UTP DDC CAT5 PINOUT, using a straight pin-to-pin cable with RJ-45 connectors:

Figure 9: CAT5 PINOUT

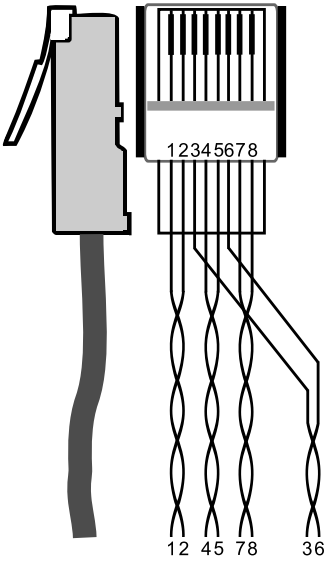

Table 5: CAT5 PINOUT

EIA /TIA 568A	
PIN	**Wire Color**
1	Green / White
2	Green
3	Orange / White
4	Blue
5	Blue / White
6	Orange
7	Brown / White
8	Brown
Pair 1	4 and 5
Pair 2	3 and 6
Pair 3	1 and 2
Pair 4	7 and 8

EIA /TIA 568B	
PIN	**Wire Color**
1	Orange / White
2	Orange
3	Green / White
4	Blue
5	Blue / White
6	Green
7	Brown / White
8	Brown
Pair 1	4 and 5
Pair 2	1 and 2
Pair 3	3 and 6
Pair 4	7 and 8

5.4 Avoiding Pitfalls using the 631T / 631R

Be aware of the following:

- **If the display device shows only a black screen** – be sure that the AC plugs and the DC jacks used by external power supplies are firmly connected; that the power bars are live; and that the **631T / 631R** are connected correctly to the media receiver or computer and display, respectively. Also, check if the media receiver or computer and display are powered on and properly booted. In addition, reboot the system after reconnecting the optical system cable
- **If the screen is distorted or displays noise** - check if the graphics resolution is properly set. Go to the Display Properties of Windows and click on the Settings. Be sure that the resolution is set at equal to or less than UXGA (1600x1200) at 60Hz refresh ratio. In addition, reset the system. Power down, disconnect and reconnect the optical system cable and/or the DC power adapter(s), and power up

1 Digital Display Channel

- **Maintenance** - these cables contain sensitive fiber optic materials that can be damaged through rough handling. Use caution during the installation and use of these cables to ensure that you do not damage them. Avoid installing the cables in an environment where it could be stepped on, run over, pinched or crushed

6 Technical Specifications

Table 6 includes the technical specifications[1] of the **631T** and **631R**:

Table 6: Technical Specifications[2] of the 631T / 631R

	631T	**631R**
INPUTS:	HDMI Connector	1 RJ-45 DDC (CAT5) connector
OUTPUTS:	1 RJ-45 DDC (CAT5) connector	HDMI Connector
BANDWIDTH:	Supports up to 1.65Gbps bandwidth per graphic channel	
COMPLIANCE WITH HDMI STANDARD:	Supports HDMI 1.0, using fiber optic communication links and DDC2B	
EXTENSION LIMIT:	100m (>320 feet) for UXGA (1600x1200) at 60Hz refresh rate in ultimate operation	
FIBER-OPTIC CONNECTION:	Each has 2 duplex LC receptacles connected to four 62.5/125µm or 50/125µm Multi-Mode glass fibers cables	
INDICATOR LEDs:	POWER LED and LINK LED	
POWER SOURCE:	12 VDC 140mA	
DIMENSIONS:	12cm x 7.95cm x 2.76cm (4.7" x 3.1" x 1.08", W, D, H)	
WEIGHT:	0.3 kg. (0.67 lbs.) approx.	
ACCESSORIES:	Power supply, bracket installation kit, 1 HDMI/HDMI male-to-male cable	

1 Specifications are subject to change without notice

2 Environmental Specifications: Operating temperature: –10°C to 50°C; storage temperature: –30°C to 60°C

LIMITED WARRANTY

Kramer Electronics (hereafter *Kramer*) warrants this product free from defects in material and workmanship under the following terms.

HOW LONG IS THE WARRANTY

Labor and parts are warranted for seven years from the date of the first customer purchase.

WHO IS PROTECTED?

Only the first purchase customer may enforce this warranty.

WHAT IS COVERED AND WHAT IS NOT COVERED

Except as below, this warranty covers all defects in material or workmanship in this product. The following are not covered by the warranty:

1. Any product which is not distributed by Kramer, or which is not purchased from an authorized Kramer dealer. If you are uncertain as to whether a dealer is authorized, please contact Kramer at one of the agents listed in the web site www.kramerelectronics.com.
2. Any product, on which the serial number has been defaced, modified or removed.
3. Damage, deterioration or malfunction resulting from:
   - i) Accident, misuse, abuse, neglect, fire, water, lightning or other acts of nature
   - ii) Product modification, or failure to follow instructions supplied with the product
   - iii) Repair or attempted repair by anyone not authorized by Kramer
   - iv) Any shipment of the product (claims must be presented to the carrier)
   - v) Removal or installation of the product
   - vi) Any other cause, which does not relate to a product defect
   - vii) Cartons, equipment enclosures, cables or accessories used in conjunction with the product

WHAT WE WILL PAY FOR AND WHAT WE WILL NOT PAY FOR

We will pay labor and material expenses for covered items. We will not pay for the following:

1. Removal or installations charges.
2. Costs of initial technical adjustments (set-up), including adjustment of user controls or programming. These costs are the responsibility of the Kramer dealer from whom the product was purchased.
3. Shipping charges.

HOW YOU CAN GET WARRANTY SERVICE

1. To obtain service on you product, you must take or ship it prepaid to any authorized Kramer service center.
2. Whenever warranty service is required, the original dated invoice (or a copy) must be presented as proof of warranty coverage, and should be included in any shipment of the product. Please also include in any mailing a contact name, company, address, and a description of the problem(s).
3. For the name of the nearest Kramer authorized service center, consult your authorized dealer.

LIMITATION OF IMPLIED WARRANTIES

All implied warranties, including warranties of merchantability and fitness for a particular purpose, are limited in duration to the length of this warranty.

EXCLUSION OF DAMAGES

The liability of Kramer for any effective products is limited to the repair or replacement of the product at our option. Kramer shall not be liable for:

1. Damage to other property caused by defects in this product, damages based upon inconvenience, loss of use of the product, loss of time, commercial loss; or:
2. Any other damages, whether incidental, consequential or otherwise. Some countries may not allow limitations on how long an implied warranty lasts and/or do not allow the exclusion or limitation of incidental or consequential damages, so the above limitations and exclusions may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights, which vary from place to place.
NOTE: All products returned to Kramer for service must have prior approval. This may be obtained from your dealer.
This equipment has been tested to determine compliance with the requirements of:

EN-50081:	"Electromagnetic compatibility (EMC); generic emission standard. Part 1: Residential, commercial and light industry"
EN-50082:	"Electromagnetic compatibility (EMC) generic immunity standard. Part 1: Residential, commercial and light industry environment".
CFR-47:	FCC Rules and Regulations: Part 15: "Radio frequency devices Subpart B – Unintentional radiators"

CAUTION!

- Servicing the machines can only be done by an authorized Kramer technician. Any user who makes changes or modifications to the unit without the expressed approval of the manufacturer will void user authority to operate the equipment.
- Use the supplied DC power supply to feed power to the machine.
- Please use recommended interconnection cables to connect the machine to other components.

For the latest information on our products and a list of Kramer distributors, visit our Web site: www.kramerelectronics.com, where updates to this user manual may be found.
We welcome your questions, comments and feedback.

Safety Warning:
Disconnect the unit from the power supply before opening/servicing.

Class 1 Laser Compliance

This product complies with "21 CFR 1040.10" and "EN 60825-1".

Kramer Electronics, Ltd.
Web site: www.kramerelectronics.com
E-mail: info@kramerel.com
P/N: 2900-000105 REV 1